



# Detector Support Group

## Weekly Report, 2018-03-21

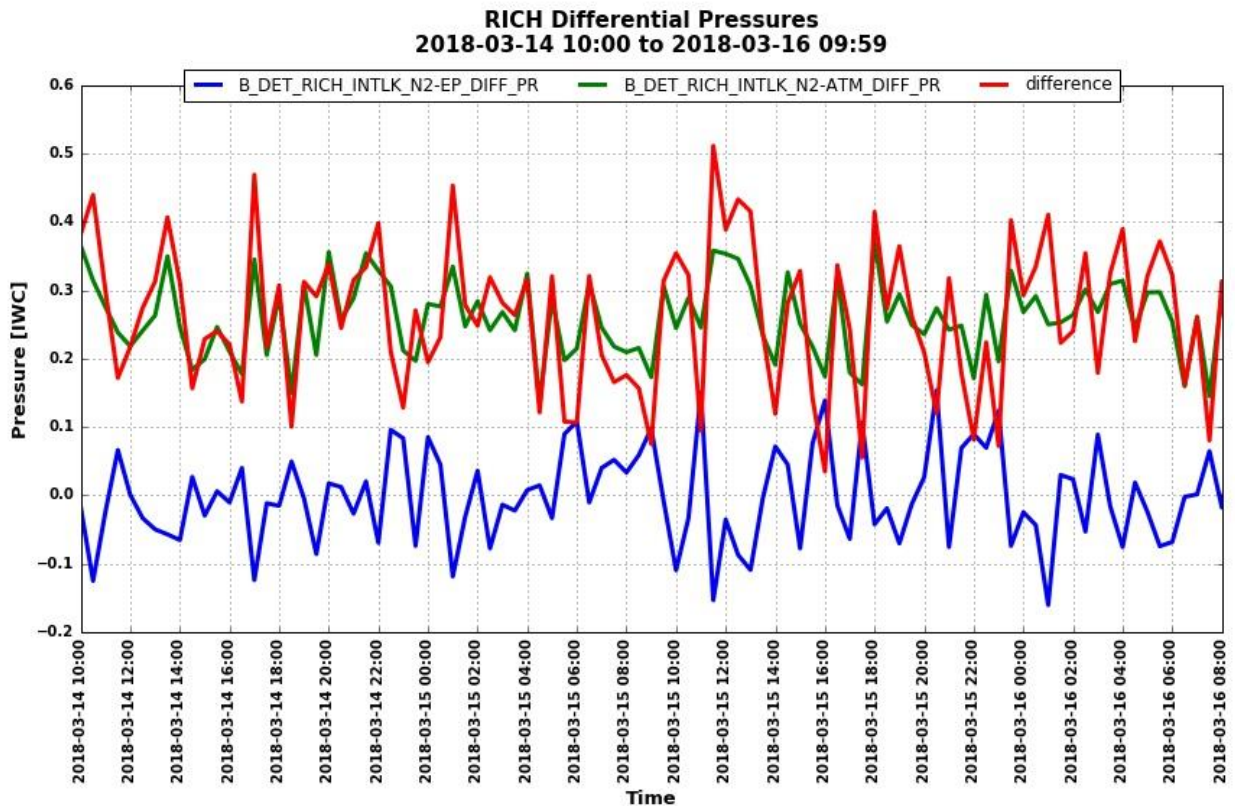
### Summary

#### Magnets

- Solenoid LV-cRIO controller problems fixed with reboot.
  - ★ Controller was unable to start program and connect to the network.
  - ★ Reported cryo alarms on the Solenoid due to wrong temperatures.
- Spreadsheet generated to analyze how the Torus “Out Of Plane Support” forces are affected during the Torus and Solenoid ramp-ups.
- Four network cables connected from cRIO to terminal server.

#### RICH

- Third cRIO chassis complete.
- Readout indicators added for differential pressure transducers and air-cooling buffer tank water concentration to Hardware Interlocks EPICS screens.
- Plot generated for differential pressure transducers.



- ★ Plot shows signals from N2-ATM differential pressure transducer (green, average:  $0.258 \pm 0.061$  IWC), N2-EP differential pressure transducer (blue, average:  $-0.002 \pm 0.068$  IWC), and difference between the two pressure transducer readings (red, average:  $0.260 \pm 0.107$  IWC).
- ★ The difference between the two pressure transducer readings is an approximation of the pressure inside the EP. For both N2 volume and EP volume, pressures are above atmospheric pressure, indicating RICH as a whole is over-pressured and external air is not being taken in through the bubbler or through leaks.



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### SVT

- LV/HV Power Supply Inhibits EPICS interface developed for Hardware Interlocks.
- Nitrogen flow stoppage investigated.
  - ★ MFC communication error was found.
    - Error was caused by Hall B Engineering disconnecting MFCs from network to move them.
  - ★ Reboot of cRIO reinitialized all MFCs and flow returned to normal.

### CRIO Test Station

- Manual 9207 samples test updated with new subVI that computes standard deviation, mean read-back, and accuracy.
- Automatic 9207 samples test updated for all channels.



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### Antonioli, Mary Ann

#### cRIO test stand

- Updated manual 9207 samples test with new subVI that computes standard deviation, mean readback, and accuracy.
  - \* Tested OK.
- Updated automatic 9207 samples test for all channels.
  - \* Tested OK.
- Researched and debugged Excel problem of rounded values.

### Bonneau, Peter

#### HDice

- Programming, testing, and debugging NMR Development test program.
  - \* Started developing subroutines to process lock-in and current shunt data arrays after a scan (data acquisition cycle) has been completed.

#### SVT

- Developed SVT LV/HV Power Supply Inhibits EPICS interface to the Hardware Interlock System.
  - \* Displays status of inhibits Mpod crate signals for R1 – R3.
  - \* Developed LV/HV power supply clear inhibits control to reset HV modules after a hardware interlock trip.
  - \* Added tab on SVT Interlock EPICS CSS main screen for inhibit controls.
  - \* Worked with Nathan Baltzell on the integration of PS inhibits interface with Hall B slow controls.
  - \* A summary talk of SVT Hardware Interlock System new version features and updates was written.

#### Hall D

- Held meetings on Hall D status and EPICS controls monitoring.

### Campero, Pablo

#### Magnets

- Debugged Solenoid LV-cRIO, controller unable to start up program and connect to the network, reported cryo alarms on the Solenoid due to wrong temperatures.
  - \* Unknown reasons to cause disconnection of the cRIO controller. Nothing found in the NI error log.
    - Noticed an offset at the controller clock time, time was indicating an hour behind.
    - Set correct time and verified in NI controller web page.
  - \* Verified User LED status indicator was not blinking (normal operations it blinks once a sec as the heartbeat).
  - \* Rebooted cRIO with hardware reset button and communication and program started to run normally
    - Temperature readout re-established and showing correct values.
- Generated spreadsheet to analyze how the Torus “Out Of Plane Support” (oops) forces are affected during the Torus and Solenoid ramp ups.



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- \* Computed data from Mya Archiver for the OOPS load cells values for different scenarios when the Solenoid and Torus are at positive and negative polarities.

### HDice

- Debugged Attenuation box with Amanda and Tyler.
  - \* Verified hardware wiring for each component in the box.
  - \* Updated NI LabVIEW and NI-MAX.
  - \* Installed NI serial drivers (V16, V17) in PC used for testing at room eel 231.
  - \* Run LabVIEW VI drivers to test proper RS232 and RS-485 serial communication.
    - Commands were properly send but readout for D-CON I/O # 3 module still conflicted.
  - \* Downloaded D-CON Utility software used to verify proper address at the D-CON I/O modules.
    - Configured settings required: Baud rate, communication protocol.
    - Unable to connect with D-CON I/O modules, address verification for modules was not done.
- Took Radiation Worker I and General Employee Radiation trainings.
- Wrote LabVIEW program to test its precision to transfer data to excel files.
  - \* Program wrote to transfer  $\pi$  and  $\pi^2$  values from LabVIEW to Excel.
  - \* Tested “Double integer” (64Bit), and “Extended precision” (128 Bit) data formats.
    - Found that the maximum number of significant digits that can be transfer from LabVIEW to excel is fourteen.
    - Used available “Excel Report” LabVIEW libraries.

### Eng. Brian

#### Hall B Gas System

- Deployed new changes to all cRIOs:
  - \* Added an EPICS PV to indicate the number of times the MFCs on that cRIO have been initialized (any number higher than 1 indicates a problem):  
B\_HW\_CRIO\_^^\_MFC\_INIT (^^ = SF, GS, or FC)
  - \* Changed the scaling on the CO2 supply pressure sensors (went from 0-300 psia to 0-400 psig).
  - \* Moved the DC R1-3 supply MFC code from the space frame to the gas shed cRIO (undo an earlier change to spread the load around).
  - \* When the MFC connection is closed (either through an error or stopping the program) the flow readback is forced to 0.
  - \* Added the HTCC gas type selection to the configuration file (to match LTCC functionality).
  - \* Increased the delay before first writing to EPICS PVs from 10 sec to 15 sec to give more time for values to get initialized, trying to avoid alarms when cRIO first starts running.
  - \* Made 5-15 psi the default pressure range for MVT mixing (used to be 8-16).



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### Hall B Magnets

- Working on adding console outputs to existing terminal server. Mindy and Tyler ran the cable already, need adapters and testing next.

### Hoebel, Amanda

#### MVT

- Investigated MFCs not working, with Tyler, Pablo, and Marc.
  - ★ Hall B engineering moved the MFCs and caused the cRIO program to stop working.

#### DC

- Recalibrated TCUs with Marc.
- Recorded TCU readings using different gas mixtures.
  - ★ 8%, 10%, 11%, 12%, and 15%
- Made plots and histograms, and calculated statistics of TCU measurements in Python for premix gas recorded 2/1/18 – 2/7/18.
  - ★ Updated TCU note to include premix statistics.

### Jacobs, George

#### GAS Systems

- Updated RICH air cooling supply P&I diagram, RICH-AirCoolCircuit.pdf.
- Monitoring LTCC S5 pressure and C4F10 supply, no loss out the bubbler since the last 2 pressure setpoint reductions, 1.4 and 1.2”wc.
- Updated LTCC Single Sector Test Status – 20 March 2018 power point.

#### HALLB

- Participated in Hall B Eng meeting.
- Discussions about cRio output to EPICS monitoring for alarms, why MFC low flow setpoints do not produce alarms when flows are zero.

### Leffel, Mindy

#### RICH

- Third cRIO chassis complete.
  - ★ Finished cutting opening for AC power plug/switch.
  - ★ Installed switch and soldered cables.
  - ★ Attached remaining cables, fuse holders, and terminal block anchors.

#### Magnet

- Network cables.
  - ★ Worked with Tyler to run four network cables from cRIO to terminal server.
- Took training.
  - ★ GEN018 Protect Vital Records, GEN035 Suspect /Counterfeit Items Awareness, and GEN300 Into to Implicit Bias.



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### Lemon, Tyler

#### RICH

- Added readout indicators for differential pressure transducers and air-cooling buffer tank water concentration to Hardware Interlocks EPICS screens.
  - ★ Testing of new screens in progress.
- Started generating detector health report.

#### SVT

- Debugged stoppage of flow in nitrogen MFCs with Amanda, Pablo, and Marc.
  - ★ MFCs could be read and set to flow using MKS-provided subVI, but MFCs would revert to zero flow when subVI was stopped.
  - ★ Noted on gas system GUI that initialization count for MFCs on Space Frame cRIO had increased, indicating an MFC communication error.
    - Found later that communication error caused by Hall B Engineering disconnecting MFCs from network to move them.
  - ★ Reboot of SF cRIO reinitialized all MFCs and flow returned to normal.

#### Hall B Magnet

- Debugged incorrect temperature readings for Solenoid LV cRIO.
  - ★ All temperatures read by Solenoid LV cRIO were 555.55 K, indicating a communication error between cRIO and PLC.
  - ★ LV cRIO could not be reached over network.
  - ★ Found that cRIO's network LEDs were blinking, but User 1 LED (used as heartbeat) was not.
  - ★ Reboot of cRIO restarted program, allowing temperatures to be correctly read.
  - ★ Could not find any error message indicating cause of problem in cRIO's error log.
- Ran four network cables with Mindy to connect all Magnet cRIOs to terminal server.
  - ★ Terminal server allows monitoring of cRIO's terminal output.
  - ★ Terminal output may give more information if Solenoid LV cRIO stops running again.

### McMullen, Marc

#### Gas System

- Wrote a timing VI in LabView to calculate the amount of time it takes for the MKS Modbus VIs to time-out. This information will be useful in future modifications of the MFC controls software. The MKS Open VI fails in 2.251ms.
- Collected all shared variables needed to datalog daily gas monitoring. This will be used to make a daily reference for Hall B gas monitoring and provide quick data for long term studies on all systems.

#### SVT

- Submitted PR for patch panel boards. The PR was signed by Hall B leader. The buyer was assigned on 03/19.

#### DC

- Worked with Hoebel on zeroing the TCUs and testing with gas standards (8%, 10%, 11%, 12%, 15%). TCU 1 did not need calibrating, TCU2 was zeroed to 3.99mA.



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